

FINAL EXAM REVIEW

QUADRATIC FUNCTIONS

1. The shape a quadratic function makes is a parabola. The maximum or minimum point of a quadratic function is called the vertex.

2. What does a solution/root/zero look like on a graph? x-intercept

3. The formula to find the axis of symmetry is $x = -\frac{b}{2a}$

4. The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. It finds the Solutions.

5. Tell whether the discriminant, $b^2 - 4ac$, must be greater than, less than, or equal to 0 to make each of the conditions true:

A. 2 x-intercepts
 $b^2 - 4ac > 0$

B. 1 x-intercept
 $= 0$

C. no x-intercepts
 < 0

1 perfect!
2 so-so
3
4
5

definitely need to re-learn this for the test!

6. Make a table of values for $y = (3x - 1)^2$

Put in $y =$ on calc

+ use [2nd] then [Graph]

x	f(x)
-2	49
-1	16
0	1
1	4
2	25

7. The height, d , of an object after t seconds is modeled by the equation $d = -16t^2 + 3500$. Find the height of the object after 3 seconds. $d(3) = -16(3)^2 + 3500 = 3,356 \text{ ft}$

8. Find the vertex of $y = -3x^2 + 12x - 8$
 $x = \frac{-b}{2a} = \frac{-12}{2(-3)} = \frac{-12}{-6} = 2$
 $y = -3(2)^2 + 12(2) - 8 = -12 + 24 - 8 = 4$

9. Find the vertex of $y = \frac{2}{3}(x - 2)^2 - 4$
 $(2, -4)$

$(2, 4)$

10. List the value of a and c , and describe how each of these values transforms the graph.

$y = -5x^2 + 8$ $a = -5 \rightarrow$ skinny

\hookrightarrow reflect / opens down

$c = 8$

\hookrightarrow shift up 8

11. Write the equation of the quadratic function with a vertex of $(3, 5)$ through the point $(2, 9)$.

x, y

1 2 3 4

$y = a(x - h)^2 + k$
plug in h, k, x, y

$9 = a(2 - 3)^2 + 5$

$9 = a(-1)^2 + 5$

$9 = 1a + 5$ $a = 4$

$y = 4(x - 3)^2 + 5$

12. Expand $(2x + 3)(x - 1)$ $2x^2 - 2x + 3x - 3$

$2x^2 + x - 3$

13. Factor $x^2 + 3x - 10$

$(x + 5)(x - 2)$

14. Find the solutions of $2x^2 + 9x = 18$ using the method of your choice.

1 2 3 4 5

$2x^2 + 9x - 18 = 0$

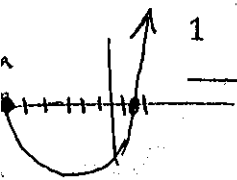
$x = \frac{-9 \pm \sqrt{9^2 - 4(2)(-18)}}{2(2)}$

$\frac{-9 + 15}{4} = \frac{6}{4} = 1.5$

$\frac{-9 - 15}{4} = \frac{-24}{4} = -6$

$= \frac{-9 \pm \sqrt{225}}{4} = \frac{-9 \pm 15}{4}$

$x = -10 + 3$



15. $i = ? \sqrt{-1}$ $i^2 = ? -1$

16. Simplify $\sqrt{-64} = \sqrt{-1} \sqrt{64} = 8i$

17. $(-2-i)(4+i) = -8 -2i -4i -i^2$
 $-8 -6i -(-1)$
 $-8 -6i +1 = -7-6i$

18. Solve $x^2 + 4 = 0$

18) $x^2 + 4 = 0$
 $-4 \quad -4$

$\sqrt{x^2} = \sqrt{-4}$
 $x = \pm 2i$

1 2 3 4 5

Overall rating for quadratic functions 1 2 3 4 5

EXPONENTIAL FUNCTIONS

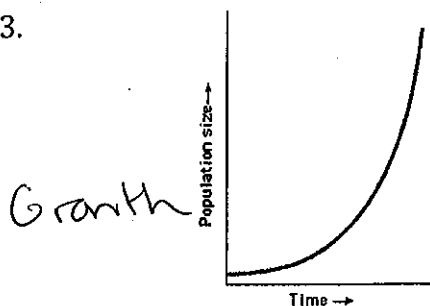
1. An exponential function takes the form $f(x) = a \cdot b^x$, where a represents start point and b represents growth or decay factor

2. If $b > 1$, the function is classified as exponential growth and if $0 < b < 1$, the function is classified as exponential decay.

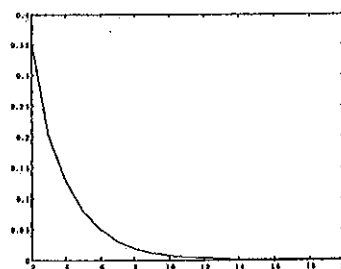
1 2 3 4 5

Are the following exponential growth or decay?

3.



4.



Decay

5.

x	y
-1	27
0	9
1	3

Decay

6. $y = -\frac{1}{3}(4)^x$

Growth

7. $y = 60(-4)^x$

Decay

1 2 3 4 5

Write the equation of the exponential function that models each situation.

$\frac{d}{3}$ b/c every 3 days

8. A scientist starts with 150 bacteria that double in population every three days. Write an equation $b(d)$ to model the number of bacteria, b , after d days. $b(d) = 150(2)^{\frac{d}{3}}$

9. I have \$2500 in a mutual fund that earns 7% every three months.

10. After the zombie antidote comes out, the 10,000 zombies begin to die out at a rate of 12% each day. $y = 10,000(0.88)^x$ $100\% - 12\% = 88\%$

11. I have 80 gummy bears and every time I go to the cupboard I eat half of the gummies.

$$y = 80\left(\frac{1}{2}\right)^x$$

1 2 3 4 5

Find x . Basics the same first! Then exponents =

$$3x - 5 = 4$$

$$\frac{3x}{3} = \frac{9}{3}$$

$$x = 3$$

12. $8^{3x-5} = 8^4$

1 2 3 4 5

13. $2^{6x-2} = 1 = 2^0$

$$\frac{6x-2}{+2} = \frac{0}{+2}$$

$$\frac{6x}{6} = \frac{2}{6}$$

$$x = \frac{2}{6} = \frac{1}{3}$$

14. $5^{-2x+1} = 125 = 5^3$

$$\frac{-2x+1}{-1} = \frac{3}{-1}$$

$$\frac{-2x}{-2} = \frac{2}{-2}$$

$$x = -1$$

15. Make a table for $f(x) = 4^{-x} + 1$

x	-2	-1	0
f(x)	17	5	2

Overall rating for exponential functions

1 2 3 4 5

TRIGONOMETRY

1. I can only use the Pythagorean Theorem and trig functions if I have a right triangle.

2. A good first step to any problem that uses a trig function is to label the sides.

3. The nine letter device that is used to help me remember the definitions of sine, cosine, and tangent is SOH - CAH - TOA.

4. The longest leg of a triangle is called the hypotenuse.

5. An angle can either be measured in radians or degrees.

6. The height of a wave is called the amplitude and how long it takes before the wave repeats is called the period.

1 2 3 4 5

7. Convert $\frac{3\pi}{7}$ radians to degrees.

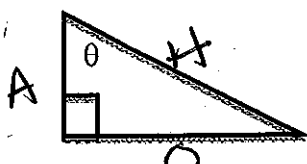
$$\frac{3\pi}{7} \times \frac{180^\circ}{\pi \text{ rad}} = \frac{3 \cdot 180}{7} = 77.14^\circ$$

8. Convert 80° to radians

$$\frac{80^\circ}{1} \times \frac{\pi \text{ rad}}{180^\circ} = \frac{80\pi}{180} = \frac{4\pi}{9}$$

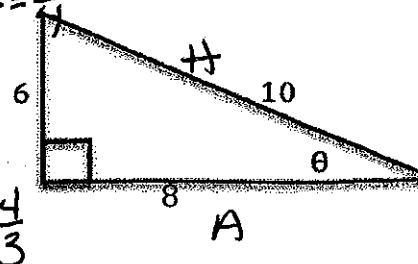
1 2 3 4 5

9. For the right triangle and angle indicated, label which side is the hypotenuse, opposite and adjacent.



$$\sin \theta = \frac{6}{10} = \frac{3}{5} \quad \csc \theta = \frac{5}{3}$$

$$\cos \theta = \frac{8}{10} = \frac{4}{5} \quad \sec \theta = \frac{5}{4}$$



10. For the triangle to the right, find the value of the six trig functions.

1 2 3 4 5

$$\tan \theta = \frac{6}{8} = \frac{3}{4}$$

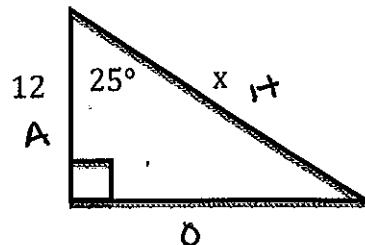
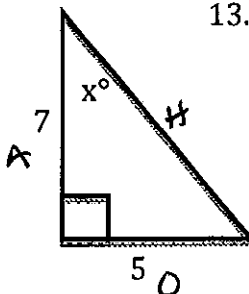
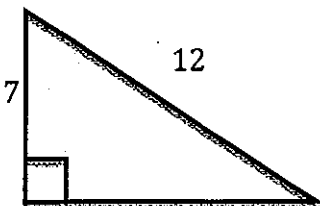
$$\cot \theta = \frac{4}{3}$$

Find the missing angle or side length.

11.

12.

13.



$$7^2 + x^2 = 12^2$$

$$49 + x^2 = 144$$

$$-49 \quad -49$$

$$x^2 = 95$$

$$x = \sqrt{95} \approx 9.75$$

1 2 3 4 5

$$\tan x = \frac{5}{7}$$

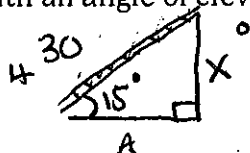
$$x = \tan^{-1}\left(\frac{5}{7}\right) = 35.5^\circ$$

$$\cos 25^\circ = \frac{12}{x}$$

$$x = \frac{12}{\cos 25^\circ} = 13.24$$

14. A 30 ft ladder sits against a wall with an angle of elevation of 15 degrees. How high up on the wall is the ladder?

1 2 3 4 5



$$\sin 15^\circ = \frac{x}{30}$$

$$x = 30 \cdot \sin 15^\circ = 7.76 \text{ ft}$$

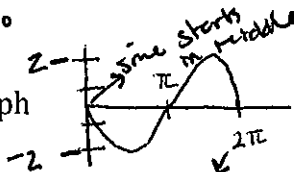
15. Find the period of $y = 4 \cos 2x$

$$\frac{2\pi}{2} = \pi \text{ rad or } \frac{360}{2} = 180^\circ$$

16. Find the amplitude of $y = -6 \sin 3x$

$$|a| = |-6| = 6$$

17. Write an equation for the graph

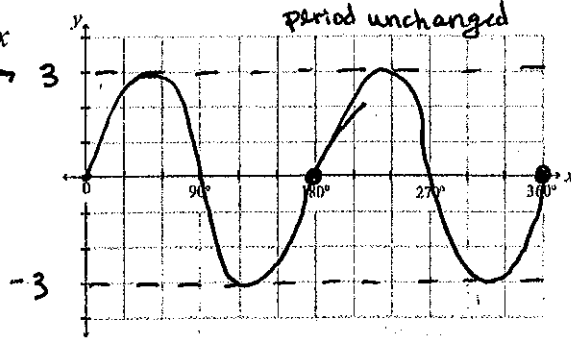


$$y = -2 \sin x$$

18. Graph $y = 3 \sin 2x$

$$\text{Period} = \frac{360}{2} = 180^\circ$$

$b=2 \Rightarrow 2$ complete waves fit in 360°



1 2 3 4 5

Overall rating for trigonometry

1 2 3 4 5